



George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812

QD-A-005
REVISION: B
EFFECTIVE DATE: January 14, 2005

ORGANIZATIONAL INSTRUCTION

Professional Development Roadmap (PDRM) for System Safety Engineers

OPR(s)

All QD Departments

OPR DESIGNEE

Sherry Jennings

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DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Canceled)	Docume nt Revision	Effective Date	Description
Baseline	Draft 1	03/03/04	New document.
Revision	A		Revised to bring document in compliance with the HQ Rules Review Action (CAITS: 04-DA01-0387). Changes were also made to reflect S&MA organizational name changes (i.e., QS to QD).
Revision	B	01/14/05	Revisions to courses based on course availability.

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Professional Development Roadmap for S&MA System Safety Engineers

1. PURPOSE, SCOPE, APPLICABILITY

1.1. Purpose – The purpose of this Organizational Instruction (OI) is to establish a voluntary training and development roadmap for System Safety Engineers within the Marshall Space Flight Center (MSFC) Safety and Mission Assurance (S&MA) Directorate. This OI identifies the minimum level of training, knowledge and skills that MSFC S&MA System Safety Engineers should acquire in developing their engineering discipline expertise.

1.2. Scope – This OI shall serve as a development roadmap for System Safety Engineers who support MSFC programs and projects and shall be administered through the Individual Development Program (IDP) processes. It provides a comprehensive list of training, knowledge requirements and on-the-job (OJT) experience needed by MSFC S&MA System Safety Engineers to effectively execute their duties.

This roadmap establishes an entry level (Apprentice) and three achievement levels (Novice, Journeyman and Expert), and provides a process for progressive qualification at each level.

This roadmap is used in conjunction with Individual Development Plans (IDP) to encourage System Safety specialists to pursue development activities most appropriate to their specialty. The intent is to use the roadmap to guide the development of IDPs for S&MA System Safety Engineers.

The primary lines of responsibilities on Discipline Champion, Department Manager and the individual are listed in Figure 1.2

1.3. Applicability – This OI applies to all MSFC S&MA personnel who seek to provide MSFC S&MA System Safety Engineering services, both in-house and offsite, and who choose to participate. Mission support contractor personnel are also encouraged to participate in this voluntary program (or in a tailored mission support contractor program approved by the S&MA Director).

Personnel shall satisfy the prerequisites specified in this OI before participating in this roadmap process.

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S&MA PDRM – Key Lines of Responsibilities

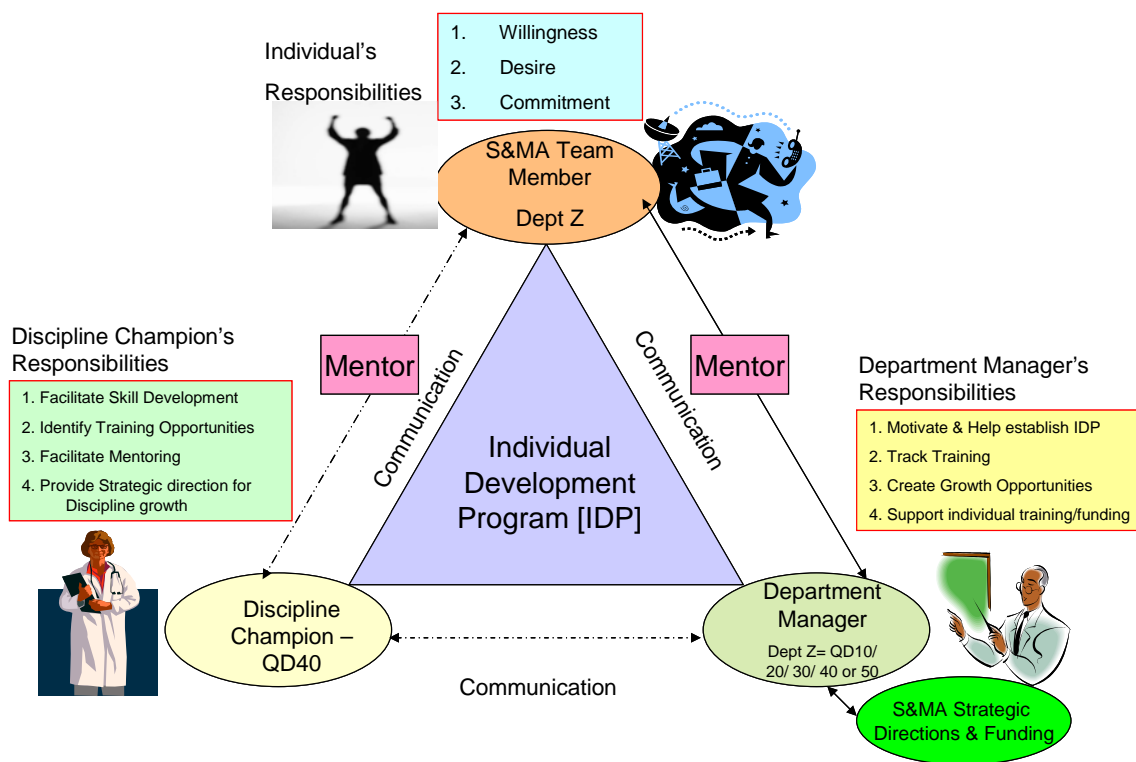


Figure 1.2 Primary Responsibilities

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2. DOCUMENTS

2.1. Applicable Documents

2.1.1 MPG 3410.1 Training

2.1.2 Individual Development Plan Instruction (Being revised)

2.2 Reference Documents

2.2.1 Organizational Instruction: Professional Development Roadmap (PDRM) for Reliability and Maintainability Engineers, Safety and Mission Assurance, Marshall Space Flight Center.

2.2.2 Organizational Instruction: Professional Development Roadmap (PDRM) for Quality Engineers, Safety and Mission Assurance, Marshall Space Flight Center.

3. DEFINITIONS AND ACCRONYMS

3.1 The Professional Development Roadmap (PDRM) identifies and documents the minimum training, knowledge requirements and on-the-job (OJT) experience needed by MSFC S&MA personnel at three levels of their discipline expertise development.

3.2 Individual Development Plan (IDP) – is a document developed jointly by the employee and supervisor to plan the employee’s training and development needs as well as to identify possible training solutions. This plan focuses on immediate and short-term goals that are in line with the longer-term goals of both the employee and the organization. The IDP focuses on enhancing the competencies the employee needs to improve the Center’s, and ultimately, the Agency’s effectiveness.

3.3 Qualification – the act of verifying and documenting that personnel have completed required training and have demonstrated specified proficiency.

3.4 Qualification levels – are defined as:

- Apprentice: Candidate who has been found to have satisfied the prerequisites qualifications.
- Novice: Entry level of expertise (Appendix A).
- Journeyman: Intermediate level of expertise (Appendix B).
- Expert: The highest level of expertise (Appendix C).

3.5 Qualification Criteria – are specified in Appendix A (Novice), Appendix B (Journeyman) and Appendix C (Expert) and include three categories of accomplishments that demonstrate discipline expertise:

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- Training – traditional, online and computer based.
- Reference documents – demonstrating understanding.
- On the Job training (OJT) – demonstrating specific skills.

3.6 Prerequisites – criteria to be satisfied prior to becoming an Apprentice and participating in the PDRM process are specified in Appendix A.

3.7 Application for Qualification: - document submitted by the candidate seeking Qualification at the completion of the requirements at each level. Application consists of:

- Completed and approved application Form (Appendix D).
- Completed and approved copy of Appendix A, (for Novice qualification), Appendix B (for Journeyman Qualification) or Appendix C (for Expert qualification).

3.8 Implementation requirements – are specific actions required to initially implement this OI. (See section 4.1).

3.9 Qualification of Experienced Personnel – may be earned by documenting candidate's previously completed training and development. (See section 4.3).

3.10 Qualification by Designation (Grandfathering) – is qualification prior to completion of the required PDRM line items. This can be done only during initial process implementation stages to create Discipline Champion and Mentors. Personnel qualified in this manner are expected to document their qualifications as soon as possible thereafter. (See section 4.4).

3.11 Equivalent Training Criteria – are classes or experiences that may be substituted for those specified in the Appendices. During initial stages of the program, or when new employees are transferred into S&MA, previously completed items may be substituted with approval of the Champion. Thereafter, the Champion approves all equivalent criteria in advance.

3.12 Personnel and Roles – required to implement this OI are defined below:

3.12.1 Candidate – is an employee or mission support contractor who seeks qualification via the PDRM process.

3.12.2 Supervisor – the organizational line manager who provides supervisory functions and responsibilities for employee positions requiring training and/or qualification. The supervisor helps create and approves the candidate's IDP, verifies completion of the OJT requirements, and recommends the candidate for qualification.

3.12.3 Mentor / Mentee – A professional development relationship between a person already qualified to a discipline level and a person seeking qualification to that level.

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3.12.3.1 Mentor – is an experienced System Safety Engineer who is selected as, and who agrees to perform as, a coach to the candidate in the PDRM qualification process. Mentors are also responsible for verifying a candidate’s understanding of the required reference documents.

Mentors are normally required to be qualified at least at the Journeyman Level (Expert level if mentoring a candidate for Expert qualification).

A System Safety Engineer who does not meet the qualification requirement, but who has extensive and relevant experience, may be approved to serve as Mentor on a case-by-case basis. This exception requires approval by the candidate’s supervisor and the Discipline Champion.

3.12.3.2 Mentee is a candidate who is working with a mentor to achieve the next higher level of qualification in his/her declared discipline. Mentee responsibilities include:

- Discussing your ideas, goals, aspirations and plan for action with your mentor and your supervisor as appropriate.
- Preparing an Individual Development Plan (IDP) that identifies:
 - Developmental objectives
 - Necessary training courses as well as on-the-job (OJT)
- Identifying and coordinating with your mentor and supervisor developmental objectives that are specific, measurable, achievable, and compatible with the PDRM.
- Reaching consensus with your mentor and supervisor on an IDP.
- Accepting responsibility for accomplishment of both your current job and IDP requirements.
- Seeking advice from your mentor on organizational norms and expectations as appropriate.
- Reaching agreement with your mentor on a schedule of regular mentor/mentee meetings.
- Seeking feedback from your mentor and others regarding your strengths and additional developmental needs.

3.12.4 System Safety Engineering Discipline Champion – is an individual recognized as a key leader in the S&MA System Safety discipline, and is designated by the S&MA Director (or his/her designee). The Champion is responsible to the S&MA Training Manager for technical content of this PDRM, approval of any “equivalent” criteria, selecting and training Mentors, and

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participation in the Qualification Review Board.

3.12.5 Qualification Review Board – is responsible for reviewing and approving qualification applications. The Board consists of the S&MA Director (or his/her designee), the Discipline Champion, and others selected by the S&MA Director. The Board also reviews and approves any changes to this OI.

3.13 PDRM Designation Memorandum – a document signed by the Director of S&MA that identifies S&MA personnel who are authorized to serve as Discipline Champion, Mentors and Qualification Review Board members.

4. INSTRUCTIONS

4.1 Implementation Requirements – Implementation of this OI shall begin upon approval by the S&MA Director, and shall require the following additional actions:

- Selecting the System Safety Engineering Discipline Champion, and designating (grandfathering) him/her to be qualified at the Expert level.
- Selecting System Safety Engineering Discipline Mentors, and designating (grandfathering) them to be qualified at the Journeyman or Expert level.
- Appointing Qualification Review Board Members.
- Publishing the PDRM Designation Memorandum.
- Authorizing and initiating a work task for the Champion and/or Mentors to prepare a set of checklists and sample questions to be used as guidelines for demonstrating candidate knowledge of the reference documents.
- Formalizing and baselining the in-house courses identified in the appendices that are currently taught informally by NASA employees and mission support contractors
- Communicating to all personnel of the existence, purpose, expectations, process and names of key personnel associated with this OI.

4.2 Qualification Process (Normal) - A candidate seeking qualification shall use the following process. This process is further illustrated in the flow chart in Section 11.

4.2.1 Candidate shall declare S&MA specialty as System Safety Engineer. Supervisor shall approve. (See Appendix E) [Per the form provided in Appendix E, the mentor and Discipline Champion also approve the candidates specialty declaration.]

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4.2.2 Candidate shall document completion of prerequisites utilizing a completed copy of the application form (Appendix D). The candidate becomes an Apprentice.

4.2.3 Supervisor shall seek/assign Mentor (with support from the Discipline Champion). (See Appendix E)

4.2.4 Apprentice shall work with Supervisor to develop an IDP containing appropriate items from the PDRM (Appendix A).

4.2.5 Apprentice shall pursue the required developmental activities per the PDRM and IDP.

4.2.6 Upon completion of each developmental activity, the Apprentice shall obtain the proper signature on the PDRM (Appendix A) as shown in the following table:

Criteria Type	Required Activity	Verifying Signature
Training Classes	Complete successfully	Training Department
Reference Documents	Demonstrate understanding	Mentor
OJT Experiences	Complete successfully	Supervisor

4.2.7 Upon completion and documentation of all required activities for qualification, Apprentice shall complete the application form, obtain signature from the Discipline Champion and submit completed package to his/her Supervisor.

4.2.8 Supervisor shall sign the application and forward it to the S&MA Director for action by the Qualification Review Board.

4.2.9 The Qualification Review Board shall review the application, and make the approval decision.

4.2.10 A Novice may earn Journeyman qualification by continuing the above process using Appendix B.

4.2.11 A Journeyman may earn Expert qualification by continuing the above process using Appendix C.

4.2.12 There is an incentive program associated with qualification of each level in the PDRM. See Appendix F for program details.

4.3 Qualification of Experienced Personnel - Existing S&MA personnel and new personnel

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hired/transferred into S&MA, who are experienced in the System Safety Engineering discipline, may seek qualification at any level for which they qualify by documenting their previously completed achievements and using the following process. This process is further illustrated in the flow chart in Section 11.

4.3.1 Candidate shall document previously completed training classes and OJT achievements on the appropriate appendices (e.g. a candidate applying for Expert qualification shall complete Appendix A, B and C):

- Equivalent training and experiences may be substituted for the criteria specified in the appendices with the approval of the Discipline Champion.
- The training department shall verify training classes. Candidates are responsible for providing proof (e.g. copies of certificates, grade reports and/or transcripts) of non-NASA training to the training department.
- OJT shall be verified by signature of the Supervisor.

4.3.2 Candidate shall demonstrate his/her understanding of the reference documents using the normal qualification process (See section 4.2).

4.3.3. Upon completion and documentation of all required activities for qualification, candidate shall complete the application form (Appendix D), obtain Discipline Champion approval and submit the package to his/her Supervisor for approval.

4.3.4 Supervisor shall approve the application and forward it to the Qualification Review Board for action.

4.3.5. The Qualification Review Board shall review the application and decide the qualification level to be granted. The appropriate incentive will then be awarded to the applicant. (See Appendix F)

4.4 Qualification by Designation (Grandfathering) – During the initial PDRM process implementation, the S&MA Director (or his/her designee) may certify the Discipline Champion and Mentors prior to their completion of the PDRM application. Any personnel so qualified are expected to document their qualifications per the PDRM process for experienced personnel (section 4.3) as soon as possible thereafter.

4.5 Maintaining Qualification - It is expected that personnel qualified at the Expert level shall (1) continue training (at least 40 hours per year in their discipline) (2) continue to perform OJT activity at the level described in Appendix C and (3) actively participate in the monthly system safety working group meetings.

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4.6 System Safety Working Group Meetings - Personnel who declare system safety as their core discipline shall attend the monthly system safety working group meetings unless assigned project duties preclude participation. (If assigned duties conflict with the scheduled working group meetings, personnel shall notify their supervisor.) The main goal of this meeting is to improve the quality, consistency and effectiveness of system safety as it is implemented across all projects at MSFC.

These meetings shall provide a forum for working group members to exchange information and ideas with other personnel involved in system safety and to stay current with the latest policies, techniques and findings in the system safety discipline. Training shall be discussed at each meeting and will occasionally occur during the working group meetings. Working group meetings shall be used to inform participants of future training opportunities and to discuss any individual training needs. Participants shall discuss activities within their assigned projects that may have relevance or interest to other working group members.

The System Safety Discipline Champion shall be responsible for conducting the working group meetings including establishing an agenda, finding appropriate facilities and making any special arrangements, as needed, for the meetings. All other working group members shall actively participate in meetings and present items of interest when requested. To remain current in the qualification process, personnel shall participate in working group meetings or provide rationale to their supervisor explaining the reason that they were not able to attend any working group meetings they miss.

4.7 Process Measurement - shall be accomplished by baselining the number of personnel qualified at each level, and thereafter measuring the progress toward qualification by S&MA personnel. The baseline shall be created 6 months after implementation. Measurements shall be made semi-annually thereafter. Each semi-annual measurement shall count the number of individuals qualified at each level, and estimate the progress (percent complete) of each participating individual toward the next level. Department Managers shall report this measurement at the next scheduled monthly status review.

Working group member participation in the system safety working group meetings shall be tracked by the Discipline Champion and reported to the S&MA management on a monthly basis. Personnel shall attend working group meetings to remain active in the system safety qualification process.

4.8 Amendments – Changes to this Organizational Instruction are made per the documented Organizational Instruction Change Process. The Qualification Review Board shall review proposed changes to this PDRM prior to submitting them to the MSFC Director of S&MA for approval. The custodial responsibility for this PDRM shall be assigned to the Safety, Reliability, and Quality Assurance Policy and Assessment Department (QD40).

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5. NOTES

5.1. OI Replacement - This instruction replaces QD-A-005 Revision B, “**Professional Development Roadmap (PDRM) for System Safety Engineer**”, dated 12/6/2004

6. SAFETY PRECAUTIONS AND WARNING NOTES

None

7. APPENDICES, DATA, REPORTS, AND FORMS

- A – PDRM for System Safety Engineers: Novice
- B – PDRM for System safety Engineers: Journeyman
- C – PDRM for System Safety Engineers: Expert
- D – Qualification Application Form
- E- Discipline Declaration Form
- F- Incentive Program for S&MA Professional Development Program

8. RECORDS

<u>Record</u>	<u>Repository</u>	<u>Period of Time</u>
Completed PDRM (Official Course completion information to be kept by the MSFC Training Office)	S&MA Training Officer	5 years (Documentation of the appropriate PDRM to be kept by the MSFC Training Office.)

9. TOOLS, EQUIPMENT, AND MATERIALS

None

10. PERSONNEL TRAINING REQUIREMENTS

See Appendix A - F

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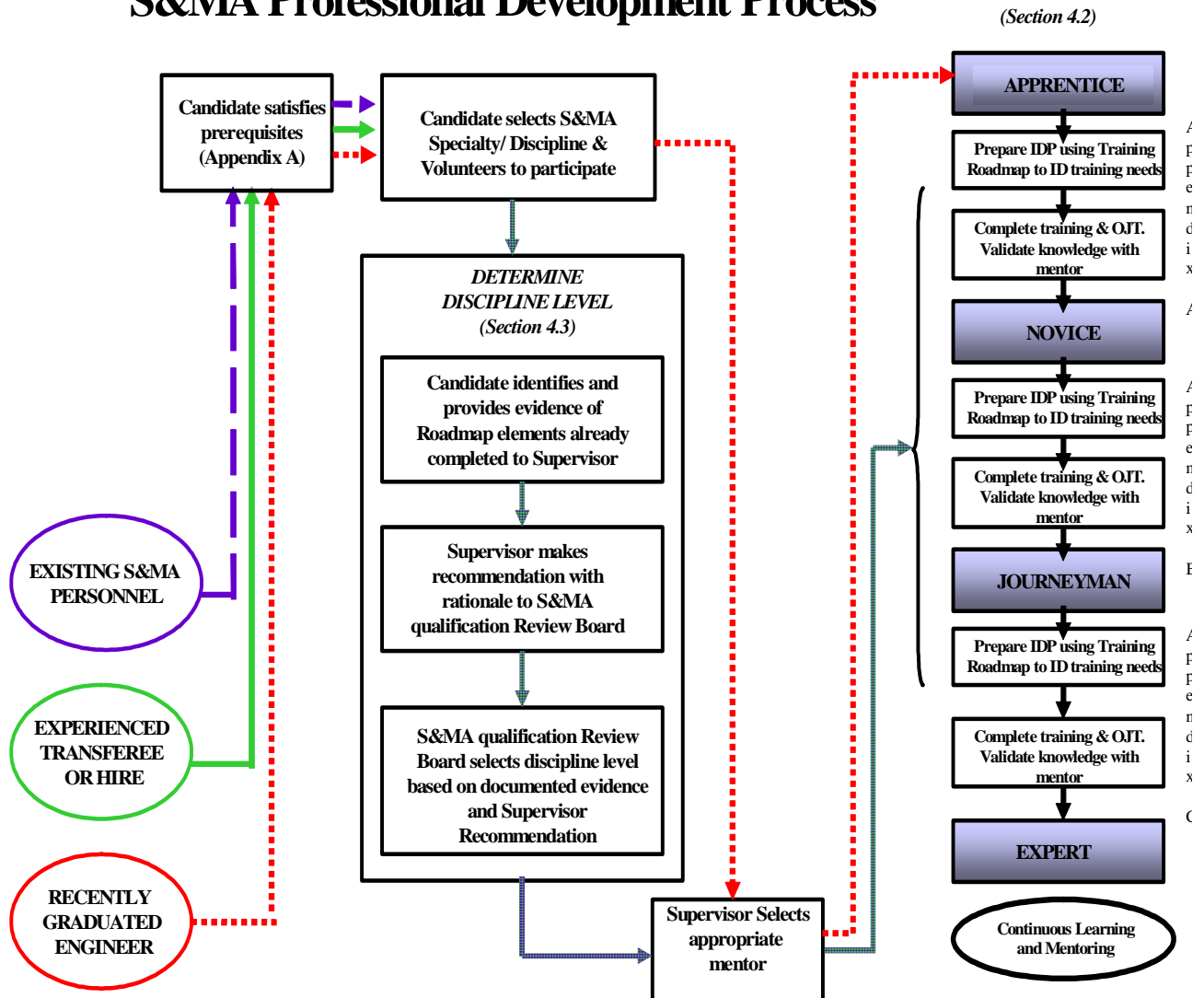
11. FLOW DIAGRAM

The flow diagram (Figure 11-1) illustrates the PDRM qualification process described in this OI.

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Figure 11-1

S&MA Professional Development Process



Notes:

1. Qualification Review Board is the decision authority for qualification levels and approvals.

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APPENDIX A: PDRM for System Safety Engineers: NOVICE Qualification Requirements

A.1 Objective:

This Appendix provides the qualification criteria for System Safety Engineers to be qualified at the Novice level, using the process described in the body of the Organization Instruction.

A.2 Prerequisites:

Prior to beginning the process, the candidate shall qualify as an Apprentice System Safety Engineer by satisfying the following prerequisites:

1. Candidate shall be an Aerospace Technology Professional (AST) with an appropriate engineering/scientific degree (chemical, electrical, electronic, industrial, mechanical, system, or equivalent)
2. Candidate shall volunteer to participate in the PDRM qualification program, declare his/her specialty as System Safety Engineer, and obtain approval of his/her immediate supervisor.
3. Candidate shall complete the S&MA Overview Orientation Class (currently a 4 hour internal class). This class can be waived by the supervisor for personnel who have been in the S&MA Directorate for at least 3 months.
4. Candidate shall complete a program specific overview orientation class for the candidate's assigned program, including the S&MA aspects of that program, if such a class is available for the assigned program. A program milestone meeting (PDR, CDR, etc.), program technical interchange meeting, a safety review or an orientation discussion with a senior program member can be substituted for an orientation class. This class may be waived by the supervisor for personnel who have been participating in the program prior to entering this qualification program.
5. Candidate shall be skilled in the use of the MS Office Suite including Word, Excel and PowerPoint, and shall show evidence of capability to make an effective presentation. The supervisor shall determine the adequacy of skills in the use of MS Office applications and presentation skills and shall recommend training in any specific application, as needed.

A.3 Experience:

Candidate shall have at least 1 to 3 years of relevant experience in the discipline prior to earning the Novice Qualification. The candidate shall participate in system safety working group meetings to qualify as a Novice and to maintain that qualification level.

**APPENDIX A: PDRM for System Safety Engineers:
NOVICE Qualification Requirements**

TRAINING CLASS REQUIREMENTS Equivalent classes may be substituted with approval by the Discipline Champion. Sequence is suggested but not mandatory.		SIGNATURE/ DATE COMPLETE
System Safety: Solar – SMA-066-01		<div style="border-bottom: 1px solid black; width: 100%;"></div> <div style="display: flex; justify-content: space-between;"> Signature Date </div>
System Safety Fundamentals: NSTC 002 (5 days)		<div style="border-bottom: 1px solid black; width: 100%;"></div> <div style="display: flex; justify-content: space-between;"> Signature Date </div>
System Safety Basics: MSFC S&MA class taught by HEI/John Livingston (2 hours)		<div style="border-bottom: 1px solid black; width: 100%;"></div> <div style="display: flex; justify-content: space-between;"> Signature Date </div>
Characteristics of Effective Hazard Reports: MSFC S&MA class taught by HEI/John Livingston (2 hours)		<div style="border-bottom: 1px solid black; width: 100%;"></div> <div style="display: flex; justify-content: space-between;"> Signature Date </div>
Lessons Learned Information System (LLIS): Solar-SMA-027-01		<div style="border-bottom: 1px solid black; width: 100%;"></div> <div style="display: flex; justify-content: space-between;"> Signature Date </div>
Lessons Learned from the Apollo, Challenger and Columbia Accidents. MSFC S&MA Class. (2 hours per accident)		<div style="border-bottom: 1px solid black; width: 100%;"></div> <div style="display: flex; justify-content: space-between;"> Signature Date </div>
Project specific System Safety Class (Note 1): For Payloads: -Payload Safety Review and Analysis (Payloads only): NSTC 011 (4 days) -Payload Safety Review Process & Requirements: NSTC 016 (1 day) For Exploration: -Space Safety Overview: NSTC 078 (1 day) OR - Equivalent class for Space Shuttle or ISS Elements, if available.		<div style="border-bottom: 1px solid black; width: 100%;"></div> <div style="display: flex; justify-content: space-between;"> Signature Date </div>
System Safety Management: University of Washington, Seattle Washington (estimated 1 week) (Note 3) http://www.engr.washington.edu/epp/safety/		<div style="border-bottom: 1px solid black; width: 100%;"></div> <div style="display: flex; justify-content: space-between;"> Signature Date </div>

APPENDIX A: PDRM for System Safety Engineers: NOVICE Qualification Requirements

Foundations of Project Management: APPL class (4 days) (Note 3)		_____ Signature Date
Microsoft Project-Introduction: MSFC video class, Building 4200 (Number TBD) OR MSFC Professional Development Class (2.5 days). (OPTIONAL)		_____ Signature Date
Technical Writing: Class to be identified by candidate and mentor (1 day)		_____ Signature Date
Influencing Others: MSFC Organizational Development Class (1 day)		_____ Signature Date
Conflict Management: MSFC Professional Development Class (2 days)		_____ Signature Date

Notes:

1. One project specific class appropriate to the candidate's job assignment is required, if available; Additional ones are optional.
2. Classes identified as "In House" to be formally registered with the training department.
3. This class will be brought to MSFC. Every effort should be made to take the course when it is available at MSFC since travel funding and course space at the remote facility will be extremely limited, if available at all.

**APPENDIX A: PDRM for System Safety Engineers:
NOVICE Qualification Requirements**

REFERENCE MATERIALS Demonstrate familiarity with key concepts as defined by the Discipline Champion		SIGNATURE/ DATE COMPLETE
OI QD-SS-001, Procedures for Reviewing Hazard Analysis http://inside.msfc.nasa.gov/MIDL/		_____ Signature date
OI QD-SS-011, Procedures for Performing Hazard Analysis http://inside.msfc.nasa.gov/MIDL/		_____ Signature date
NPR 8715.3: NASA Safety Manual (Chapter 3, System Safety) http://nodis3.gsfc.nasa.gov/		_____ Signature date
NPD 8700.1: NASA Policy for Safety and Mission Success. http://nodis3.gsfc.nasa.gov/		_____ Signature date
MSFC-HDBK-3173: Project Management and Systems Engineering Handbook (Section 4.1, 4.2.1-4.2.6, 4.2.12.8, 4.2.12.10, 4.3.1.1 (and sub paragraphs in 4.3.1.1) 4.3.1.8, 4.3.1.9 (and sub paragraphs in 4.3.1.9) 4.4.3.7.4, 4.5) https://masterlist.msfc.nasa.gov/mpdms/M/documents/MSFCHDBK3173RevA102703.doc		_____ Signature date
MWI 1700.2: System Safety Program https://webpub.nis.nasa.gov/directives/directives.htm		_____ Signature date
NPR 8000.4: Risk Management		

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NOVICE Qualification Requirements**

Procedures and Guidelines http://nodis3.gsfc.nasa.gov/		_____ Signature date
Columbia Accident Investigation Board Report. Volume 1 (pgs 3-11, Chapter 6, Section 7.4 pgs 184-193, pg 213-217) http://www.caib.us/		_____ Signature date
Rogers Commission Report (Chp 5, 6 and 7) http://science.ksc.nasa.gov/shuttle/missions/51-l/docs/rogers-commission/table-of-contents.html		_____ Signature date

PROGRAM/PROJECT SPECIFIC TRAINING (ONLY REQUIRED IF ASSIGNED TO ASSOCIATED PROGRAM/PROJECT)

Shuttle Safety Requirements (Note 2): <ul style="list-style-type: none"> - NSTS 07700: Space Shuttle Program Definition and Requirements - NSTS 5300.4 (ID-2): Space Shuttle Safety, Reliability, Maintainability and Quality Provisions - NSTS 08117: Requirements and Procedures for Qualification of Flight Readiness - NSTS 08126: Problem Reporting and Corrective Action (PRACA) System Requirements - NSTS 22254: Methodology for Conduct of NSTS Hazard Analyses - NSTS 22206: Requirements for Preparation and Approval of Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL) 		
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**APPENDIX A: PDRM for System Safety Engineers:
NOVICE Qualification Requirements**

		<div> <div>Signature</div> <div>date</div> </div>
ISS Element System Safety Requirements and Process (Note 2): <ul style="list-style-type: none"> - SSP 50021: ISS Safety Requirements Document - SSP 30599: ISS Safety Review Process - SSP 30309: Safety Analysis and Risk Assessment Requirements Document - SSP 50038: Computer-Based Control System Safety Requirements - KHB 1700.7: Space Shuttle Payload Ground Safety Handbook 		<div> <div>Signature</div> <div>date</div> </div>
Shuttle and ISS Payloads System Safety Requirements and Process standards (Note 2): <ul style="list-style-type: none"> - NSTS 1700.7: Safety Policy and Requirements for Payloads Using the Space Transportation System - NSTS 1700.7, Addendum 1: Safety Policy and Requirements for Payloads Using the ISS - KHB 1700.7: Space Shuttle Payload Ground Safety Handbook - NSTS 13830: Payload Safety Review and Data Submittal Requirements - NSTS 18798: Interpretations of NSTS/ISS Payload Safety Requirements - JSC 26943: Guidelines for the Preparation of Payload Flight Safety Data Packages and Hazard Reports for Payloads Using the Space Shuttle 		

**APPENDIX A: PDRM for System Safety Engineers:
NOVICE Qualification Requirements**

		<div> <div></div> <div>Signature</div> <div>date</div> </div>
<p>Expendable launch Vehicles Safety Requirements and Process Standards (Note 2):</p> <ul style="list-style-type: none"> - KHB 1710.2: KSC Safety Practices Handbook - CSTCR 127-1: Consolidated Space Test Center Regulation - EWR 127-1: Eastern and Western Range Safety Requirements Or, AFSPC MAN 91-710, Range Safety User Requirements - NPD 8700.2 Policy for Safety and Mission Assurance for Expendable Aerospace Vehicles - NPR 8705.3 Safety and Mission Assurance Requirements for Expendable Aerospace Vehicles - NASA STD 8709.2 NASA Safety and Mission Assurance Roles and Responsibilities for Expendable Launch Vehicles - NASA-STD-8719.8: Expendable Launch Vehicle Payload Safety Review Process Standard 		
DOT Advisory Circular AC 431.35-2: Reusable Launch and Re-entry Vehicle – System Safety Process (FAA Requirement)		

Notes:

1. The Discipline Champion is responsible for identifying specific level of understanding required (See section 4.1).
2. Program specific standards: Be aware of all, but be familiar with key concepts of those that apply to your assignment.

**APPENDIX A: PDRM for System Safety Engineers:
NOVICE Qualification Requirements**

ON THE JOB TRAINING Complete the following activities		SUPERVISOR SIGNATURE/ DATE COMPLETE
Under appropriate supervision, observe/support completion of a System safety checklist in support of a NASA project or program		_____ Signature date
Under appropriate supervision, observe/support conduct of hazard analysis in support of a NASA project or program		_____ Signature date
Observe a team creating a fault tree in support of a NASA project or program		_____ Signature date
Observe/support at least two different types of design reviews in support of a NASA project or program		_____ Signature date
Join and participate in relevant professional society (e.g. System Safety Society) by attending meetings and participating in discussions and activities.		_____ Signature date
Observe a Safety Review in support of a NASA project or program.		_____ Signature date

Notes:

1. Candidate is to work with his/her Supervisor to identify specific applicable assignments. Discipline Champion may be consulted to ensure proposed assignment satisfies the qualification requirements.

APPENDIX B: PDRM for System safety Engineers: JOURNEYMAN Qualification Requirements

B.1 Objective:

This Appendix provides the qualification criteria for System Safety Engineers to be qualified at the Journeyman level, using the process described in the body of this Organization Instruction.

B.2 Prerequisites:

Prior to beginning the process, the candidate shall be qualified as a Novice System Safety Engineer per the requirements in Appendix A. The candidate shall participate in system safety working group meetings to qualify as a Journeyman and to maintain that qualification level.

B.3 Years of Experience:

Candidate shall have at least 3 to 5 years of relevant experience in the discipline prior to being qualified at the Journeyman level.

**APPENDIX B: PDRM for System safety Engineers:
JOURNEYMAN Qualification Requirements**

TRAINING CLASS REQUIREMENTS Equivalent classes may be substituted with approved by the Discipline Champion. Sequence is suggested but not mandatory		SIGNATURE/ DATE COMPLETE
Basic System Safety Practices: NSTC 020 (5 half days)		_____ Signature date
Software System Safety: Solar – SMA-062-01		_____ Signature date
Reviewing and Perfecting System Safety Analysis, NSTC 022 (3 days)		_____ Signature date
Keys to Successful Project Support: MSFC Class taught by HEI/John Livingston (2hrs)		_____ Signature date
Root Cause Analysis: NSTC 049 (3 days)		_____ Signature date
Hazard and Operability Analysis (HAZOP) Methodology: NSTC 028 (2 days)		_____ Signature date
Systems Requirements: NASA Engineering Training (NET) Class (3 days) http://net.larc.nasa.gov/class.php		_____ Signature date
System Safety and Reliability Analysis: University of Washington, Seattle, WA. Tailored version on site at MSFC. (10 days) (Note 1) http://www.engr.washington.edu/epp/safety/		_____ Signature date
Systems Management: APPL Class (4 days) (Note 3) plus: - Pre-class session at MSFC to discuss relevant questions regarding System Safety role in systems engineering (led by Champion) (2 hours)		

**APPENDIX B: PDRM for System safety Engineers:
JOURNEYMAN Qualification Requirements**

- Post class student feedback to the S&MA System Safety working group (2 to 4 hours) OR, Applied Systems Engineering conducted by Honourcode, Inc. (4 days)		
Leading from the Inside Out: MSFC Professional Development Class (2 days)		_____ Signature date _____
Communicating For Results: MSFC Professional Development Class (2 days)		_____ Signature date _____
Team Development in the Workplace: MSFC Organizational Development Class (3 days)		_____ Signature date _____
Mentoring: MSFC Organizational Development Class (1 day). Suggested at end of qualification for Journeyman		_____ Signature date _____

Notes:

1. The Discipline Champion to define tailoring requirements for University of Washington class.

**APPENDIX B: PDRM for System safety Engineers:
JOURNEYMAN Qualification Requirements**

REFERENCE MATERIALS Demonstrate working knowledge with contents as defined by the Discipline Champion (Note: The candidate shall be knowledgeable of all documents in the Novice level in addition to the documents referenced here.)		MENTOR SIGNATURE/ DATE COMPLETE
NPR 8715.3: NASA Safety Manual (Entire Document) http://nodis3.gsfc.nasa.gov/		<div>_____</div> <div>Signature date</div>
NPD 8700.1: NASA Policy for Safety and Mission Success. (Entire Document) http://nodis3.gsfc.nasa.gov/		<div>_____</div> <div>Signature date</div>
MSFC-HDBK-3173: Project Management and Systems Engineering Handbook (Entire Document) https://masterlist.msfc.nasa.gov/mpdms/M/documents/MSFCHDBK3173RevA102703.doc		<div>_____</div> <div>Signature date</div>
SP-6105: NASA Systems Engineering Handbook (Section 2, Fundamentals of Systems Engineering pg 3-12, Section 3, Project Life Cycle for Major NASA Systems, pg 13-26, Section 4.6 Risk Management, pg 37-44) http://standards.msfc.nasa.gov/		<div>_____</div> <div>Signature date</div>
NASA Reference Publication 1358: Systems Engineering “Toolbox” for Design-Oriented Engineers (Section 1, Introduction, pg 1-1 to 1-8, Section 3, System Safety and Reliability Tools, pg 3-1 to 3-86, Appendix D, Hazards Checklist, pg D-1 to D-6, Appendix E, Example Preliminary Hazard Analysis, pg E-1 to E-3) http://pbma.hq.nasa.gov/mainframe_docs		<div>_____</div> <div>Signature date</div>

APPENDIX B: PDRM for System safety Engineers: JOURNEYMAN Qualification Requirements

/Documents/toolbox.pdf		
<p>“A History of Aerospace Problems, Their Solutions, Their Lessons” by Robert S. Ryan: NASA Technical Paper 3653.</p> <p>http://trs.nis.nasa.gov/archive/00000342/</p>		<p>_____ Signature date</p>
<p>Columbia Accident Investigation Board Report. Volume 1 (entire report)</p> <p>http://www.caib.us/</p>		
<p>Rogers Commission Report (entire report)</p> <p>http://science.ksc.nasa.gov/shuttle/missions/51-l/docs/rogers-commission/table-of-contents.html</p>		<p>_____ Signature date</p>
<p>NPR 7120.5: NASA Program/Project Management Processes and Requirements (Section 4.3, Risk Management, pg 52-55 Section 4.6, Safety and Mission Success, and Environmental Management, pg 61-65)</p> <p>http://nodis3.gsfc.nasa.gov/displayDir.cfm?Internal_ID=N_PR_7120_005B_&page_name=main</p>		<p>_____ Signature date</p>
<p>MWI 7120.6 Program/Project Risk Management</p> <p>https://webpub.nis.nasa.gov/directives/directives.htm</p>		<p>_____ Signature date</p>
<p>DOD MIL_STD-882: System Safety Program Requirements</p> <p>(See the MSFC Systems Safety PBMA website for a copy of this document)</p>		<p>_____ Signature date</p>
<p>NPD 8710.3, NASA Policy for Limiting Orbital Debris Generation</p> <p>http://nodis3.gsfc.nasa.gov/</p>		<p>_____ Signature Date</p>
<p>NSS 1740.14, "Guidelines and Assessment Procedures for Limiting</p>		

**APPENDIX B: PDRM for System safety Engineers:
JOURNEYMAN Qualification Requirements**

Orbital Debris. http://standards.msfc.nasa.gov/		<div style="border-top: 1px solid black; display: flex; justify-content: space-between; padding-top: 5px;"> Signature Date </div>
PROGRAM/PROJECT SPECIFIC TRAINING (ONLY REQUIRED IF ASSIGNED TO ASSOCIATED PROGRAM/PROJECT)		
Shuttle Safety Requirements (Note 2): <ul style="list-style-type: none"> - NSTS 07700: Space Shuttle Program Definition and Requirements - NSTS 5300.4 (ID-2): Space Shuttle Safety, Reliability, Maintainability and Quality Provisions - NSTS 08117: Requirements and Procedures for Qualification of Flight Readiness - NSTS 08126: Problem Reporting and Corrective Action (PRACA) System Requirements - NSTS 22254: Methodology for Conduct of NSTS Hazard Analyses - NSTS 22206: Requirements for Preparation and Approval of Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL) 		<div style="border-top: 1px solid black; display: flex; justify-content: space-between; padding-top: 5px;"> Signature date </div>
Exploration Vehicles <ul style="list-style-type: none"> - Nuclear Safety Requirements, NPR 8 715.3: NASA Safety Manual Chp 5 		
ISS Element System Safety Requirements and Process (Note 2): <ul style="list-style-type: none"> - KHB 1700.7: Space Shuttle Payload Ground Safety Handbook - SSP 50021: ISS Safety Requirements Document - SSP 30599: ISS Safety Review Process - SSP 30309: Safety Analysis and Risk Assessment Requirements Document 		<div style="border-top: 1px solid black; display: flex; justify-content: space-between; padding-top: 5px;"> </div>

**APPENDIX B: PDRM for System safety Engineers:
JOURNEYMAN Qualification Requirements**

<ul style="list-style-type: none"> - SSP 50038: Computer-Based Control System Safety Requirements 		<div>Signature</div> <div>date</div>
<p>Shuttle and ISS Payloads System Safety Requirements and Process standards (Note 2):</p> <ul style="list-style-type: none"> - NSTS 1700.7: Safety Policy and Requirements for Payloads Using the Space Transportation System - NSTS 1700.7, Addendum 1: Safety Policy and Requirements for Payloads Using the ISS - KHB 1700.7: Space Shuttle Payload Ground Safety Handbook - NSTS 13830: Payload Safety Review and Data Submittal Requirements - NSTS 18798: Interpretations of NSTS/ISS Payload Safety Requirements - JSC 26943: Guidelines for the Preparation of Payload Flight Safety Data Packages and Hazard Reports for Payloads Using the Space Shuttle 		<div>Signature</div> <div>date</div>
<p>Expendable launch Vehicles Safety Requirements and Process Standards (Note 2):</p> <ul style="list-style-type: none"> - KHB 1710.2: KSC Safety Practices Handbook - CSTCR 127-1: Consolidated Space Test Center Regulation - EWR 127-1: Eastern and Western Range Safety Requirements Or, AFSPC MAN 91-710, Range Safety User Requirements - NPD 8700.2 Policy for Safety and Mission Assurance for Expendable Aerospace Vehicles - NPR 8705.3 Safety and Mission Assurance Requirements for Expendable Aerospace Vehicles - NASA STD 8709.2 NASA Safety and Mission Assurance Roles and Responsibilities for Expendable Launch Vehicles 		<div>Signature</div> <div>date</div>

**APPENDIX B: PDRM for System safety Engineers:
JOURNEYMAN Qualification Requirements**

- NASA-STD-8719.8: Expendable Launch Vehicle Payload Safety Review Process Standard		
DOT Advisory Circular AC 431.35-2: Reusable Launch and Re-entry Vehicle – System Safety Process (FAA Requirement)		<div>Signature date</div>

Notes:

1. The participant will be expected to demonstrate a more in depth knowledge of documentation that is contained in the Novice level and repeated in the Journeyman level. Discipline Champion is responsible for identifying specific level of understanding required for each document. (See section 4.1).

2. Program specific standard: Read all; demonstrate working level understanding of those applicable to your assignment.

**APPENDIX B: PDRM for System safety Engineers:
JOURNEYMAN Qualification Requirements**

ON THE JOB TRAINING Complete the following activities in any sequence		SUPERVISOR SIGNATURE/ DATE COMPLETE
Complete (or contribute to a team completing) a system safety checklist in support of a NASA project or program		<div style="border-bottom: 1px solid black; width: 100%;"></div> <div style="display: flex; justify-content: space-between;"> Signature date </div>
Participate on a team conducting a FMEA/CIL in support of a NASA project or program, and demonstrate understanding of relationship to a hazard analysis.		<div style="border-bottom: 1px solid black; width: 100%;"></div> <div style="display: flex; justify-content: space-between;"> Signature date </div>
Conduct (or participate in a team conducting) a hazard analysis in support of a NASA project or program.		<div style="border-bottom: 1px solid black; width: 100%;"></div> <div style="display: flex; justify-content: space-between;"> Signature date </div>
Create (or contribute to a team creating) a fault tree in support of a NASA project or program		<div style="border-bottom: 1px solid black; width: 100%;"></div> <div style="display: flex; justify-content: space-between;"> Signature date </div>
Perform (or participate on a team performing) at least three different types of design reviews (including at least one PDR or later in the project life cycle) in support of a NASA project or program.		<div style="border-bottom: 1px solid black; width: 100%;"></div> <div style="display: flex; justify-content: space-between;"> Signature date </div>
Contribute to relevant professional society (e.g.: System Safety Society) activity via discussions, committee/sub-committee work or writing/presenting a paper.		<div style="border-bottom: 1px solid black; width: 100%;"></div> <div style="display: flex; justify-content: space-between;"> Signature date </div>
Participate in inter-program or inter-center coordinating activity to enhance MSFC and/or NASA expertise in your discipline		<div style="border-bottom: 1px solid black; width: 100%;"></div> <div style="display: flex; justify-content: space-between;"> Signature date </div>
Work toward professional qualification		<div style="border-bottom: 1px solid black; width: 100%;"></div>

**APPENDIX B: PDRM for System safety Engineers:
JOURNEYMAN Qualification Requirements**

		Signature date
Participate in a System Safety Review at JSC or KSC in support of a NASA project or program.		 <hr/> Signature date
Mentor other personnel in your discipline to help them improve their skills and expertise. This can be as a mentor to others in this PDRM process or as an informal coach in your daily work.		 <hr/> Signature date

Notes:

1. Candidate to work with his/her supervisor to identify specific applicable assignments. Discipline Champion may be consulted to ensure proposed assignments satisfy qualification requirements.

APPENDIX C: PDRM for System Safety Engineers: EXPERT Qualification Requirements

C.1 Objective:

This Appendix provides the qualification criteria for System Safety Engineers to be qualified at the Expert level, using the process described in the body of the Organization Instruction.

C.2 Prerequisites:

Prior to beginning the process, the candidate shall be qualified as a Journeyman System Safety Engineer per the requirements of Appendix B. The candidate shall participate in monthly system safety working group meetings to qualify as an Expert and to maintain that qualification level.

C.3 Years of Experience:

The candidate shall have at least 8-10 years of relevant discipline experience prior to becoming qualified at the Expert Level.

**APPENDIX C: PDRM for System Safety Engineers:
EXPERT Qualification Requirements**

TRAINING CLASS REQUIREMENTS Equivalent classes may be substituted with approval by the Discipline Champion. Sequence is suggested but not mandatory		SIGNATURE/ DATE COMPLETE
Fault Tree Analysis: Solar – SMA-080-02		<div style="border-top: 1px solid black; width: 100%;"></div> <div style="display: flex; justify-content: space-between; padding: 0 10px;"> Signature date </div>
Quality Program Basics: MSFC Class		<div style="border-top: 1px solid black; width: 100%;"></div> <div style="display: flex; justify-content: space-between; padding: 0 10px;"> Signature date </div>
Comprehensive Systems Skills: NASA Engineering Training (NET) Class (5 days) http://net.larc.nasa.gov/class.php		<div style="border-top: 1px solid black; width: 100%;"></div> <div style="display: flex; justify-content: space-between; padding: 0 10px;"> Signature date </div>
Advanced System Safety Practices: NSTC 021		<div style="border-top: 1px solid black; width: 100%;"></div> <div style="display: flex; justify-content: space-between; padding: 0 10px;"> Signature date </div>
Software System Safety: NSTC 025 (4 days)		<div style="border-top: 1px solid black; width: 100%;"></div> <div style="display: flex; justify-content: space-between; padding: 0 10px;"> Signature date </div>
MORT-Based Mishap Investigation: NSTC 006		<div style="border-top: 1px solid black; width: 100%;"></div> <div style="display: flex; justify-content: space-between; padding: 0 10px;"> Signature date </div>
Design for Availability: NSTC 017		<div style="border-top: 1px solid black; width: 100%;"></div> <div style="display: flex; justify-content: space-between; padding: 0 10px;"> Signature date </div>
Failure Modes Effects Analysis and Critical Items List: - Solar - SMA-017-01 (1 hour) - In house component taught by HEI Reliability Office (4 hours)		<div style="border-top: 1px solid black; width: 100%;"></div> <div style="display: flex; justify-content: space-between; padding: 0 10px;"> Signature date </div>
Advanced Topics in System Safety Workshop: New class, facilitated by subject matter expert to allow in-depth discussions of important topics in system safety. To be developed and tailored (3 days)(Note 1) Or,		<div style="border-top: 1px solid black; width: 100%;"></div> <div style="display: flex; justify-content: space-between; padding: 0 10px;"> Signature date </div>

APPENDIX C: PDRM for System Safety Engineers: EXPERT Qualification Requirements

Active participation including presenting topics of interest in the monthly System Safety Working group meetings conducted by the MSFC System Safety Working group		
Crossing Department Lines: NASA HQ Class, Agency Leadership and Development Programs (5 days).		_____ Signature date
Problem Solving and Decision Making: MSFC Organizational Development Class (3 days)		_____ Signature date
Leadership/Teamwork Class Elective: To be selected by candidate		_____ Signature date

Notes:

1. Advanced Topics in System safety Workshop is a new class to be developed/tailored. Suggested source is NSTC.

**APPENDIX C: PDRM for System Safety Engineers:
EXPERT Qualification Requirements**

REFERENCE MATERIALS Demonstrate comprehensive knowledge of contents as defined by the Discipline Champion (Note: The Candidate shall be knowledgeable of all documents referenced in the Novice and Journeyman level in addition to documents referenced here.)		MENTOR SIGNATURE/ DATE COMPLETE
SP-6105: NASA Systems Engineering Handbook (Entire Document) http://standards.msfc.nasa.gov/		<div style="text-align: right;"> <hr style="width: 100%;"/> Signature date </div>
NASA Reference Publication 1358: Systems Engineering “Toolbox” for Design-Oriented Engineers (Entire Document) http://pbma.hq.nasa.gov/mainframe_docs/Documents/toolbox.pdf		<div style="text-align: right;"> <hr style="width: 100%;"/> Signature date </div>
DOD MIL_STD-882: System Safety Program Requirements (See the MSFC Systems Safety PBMA website for a copy)		<div style="text-align: right;"> <hr style="width: 100%;"/> Signature date </div>
MWI 8621.1: Close Call and Mishap Reporting and Investigation Program https://webpub.nis.nasa.gov/directives/directives.htm		<div style="text-align: right;"> <hr style="width: 100%;"/> Signature date </div>
NPR 8621.1, NASA Procedural Requirements for Mishap Reporting, Investigating, and Recordkeeping https://nodis3.gsfc.nasa.gov/		<div style="text-align: right;"> <hr style="width: 100%;"/> Signature date </div>
Agency Contingency Action Plan for Space Flight Operations http://www.nasa.gov/pdf/2198main_COL_cap_0301.pdf		<div style="text-align: right;"> <hr style="width: 100%;"/> Signature date </div>

**APPENDIX C: PDRM for System Safety Engineers:
EXPERT Qualification Requirements**

NASA-STD-8719.13 Software Safety NASA Technical Standard http://standards.nasa.gov/		<div style="border-top: 1px solid black; margin-top: 10px;"> <div style="display: flex; justify-content: space-between; width: 100%;"> Signature date </div> </div>
NPR 7120.5: NASA Program/Project Management Processes and Requirements (Entire Document) http://nodis3.gsfc.nasa.gov/displayDir.cfm?Internal_ID=N_PR_7120_005B_&page_name=main		<div style="border-top: 1px solid black; margin-top: 10px;"> <div style="display: flex; justify-content: space-between; width: 100%;"> Signature date </div> </div>
PROGRAM/PROJECT SPECIFIC TRAINING (ONLY REQUIRED IF ASSIGNED TO ASSOCIATED PROGRAM/PROJECT)		
Shuttle Safety Requirements (Note 2): <ul style="list-style-type: none"> - NSTS 07700: Space Shuttle Program Definition and Requirements - NSTS 5300.4 (ID-2): Space Shuttle Safety, Reliability, Maintainability and Quality Provisions - NSTS 08117: Requirements and Procedures for Qualification of Flight Readiness - NSTS 08126: Problem Reporting and Corrective Action (PRACA) System Requirements - NSTS 22254: Methodology for Conduct of NSTS Hazard Analyses - NSTS 22206: Requirements for Preparation and Approval of Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL) - MSFC-SSCP-5-77: MSFC Space Shuttle Contingency Plan https://shuttleonline.msfc.nasa.gov/iso9000/index.cfm		<div style="border-top: 1px solid black; margin-top: 10px;"> <div style="display: flex; justify-content: space-between; width: 100%;"> Signature date </div> </div>
ISS Element System Safety Requirements and Process (Note 2): <ul style="list-style-type: none"> - SSP 50021: ISS Safety 		

**APPENDIX C: PDRM for System Safety Engineers:
EXPERT Qualification Requirements**

<p>Requirements Document</p> <ul style="list-style-type: none"> - SSP 30599: ISS Safety Review Process - SSP 30309: Safety Analysis and Risk Assessment Requirements Document - SSP 50038: Computer-Based Control System Safety Requirements - SSP 50190: Contingency Action Plan for ISS - KHB 1700.7: Space Shuttle Payload Ground Safety Handbook 		<div style="border-top: 1px solid black; margin-top: 20px;"> <div style="display: flex; justify-content: space-between; width: 100%;"> <div style="border-bottom: 1px solid black; width: 40%;"></div> <div style="border-bottom: 1px solid black; width: 40%;"></div> </div> <div style="display: flex; justify-content: space-between; width: 100%; margin-top: 5px;"> Signature date </div> </div>
<p>Shuttle and ISS Payloads System Safety Requirements and Process Standards (Note 2):</p> <ul style="list-style-type: none"> - NSTS 1700.7: Safety Policy and Requirements for Payloads Using the Space Transportation System - NSTS 1700.7, Addendum 1: Safety Policy and Requirements for Payloads Using the ISS - KHB 1700.7: Space Shuttle Payload Ground Safety Handbook - NSTS 13830: Payload Safety Review and Data Submittal Requirements - NSTS 18798: Interpretations of NSTS/ISS Payload safety Requirements - JSC 26943: Guidelines for the Preparation of Payload Flight Safety Data Packages and Hazard Reports for Payloads Using the Space Shuttle 		

APPENDIX C: PDRM for System Safety Engineers: EXPERT Qualification Requirements

		<div style="text-align: right;"> <div style="border-bottom: 1px solid black; width: 150px; display: inline-block;"></div> <div style="border-bottom: 1px solid black; width: 100px; display: inline-block;"></div> </div> <div style="text-align: right;"> Signature date </div>
Expendable launch Vehicles Safety Requirements and Process Standards (Note 2): <ul style="list-style-type: none"> - KHB 1710.2: KSC Safety Practices Handbook - CSTCR 127-1: Consolidated Space Test Center Regulation - EWR 127-1: Eastern and Western Range Safety Requirements Or, AFSPC MAN 91-710, Range Safety User Requirements - NPD 8700.2 Policy for Safety and Mission Assurance for Expendable Aerospace Vehicles - NPR 8705.3 Safety and Mission Assurance Requirements for Expendable Aerospace Vehicles - NASA STD 8709.2 NASA Safety and Mission Assurance Roles and Responsibilities for Expendable Launch Vehicles - NASA-STD-8719.8: Expendable Launch Vehicle Payload Safety Review Process Standard 		<div style="text-align: right;"> <div style="border-bottom: 1px solid black; width: 150px; display: inline-block;"></div> <div style="border-bottom: 1px solid black; width: 100px; display: inline-block;"></div> </div> <div style="text-align: right;"> Signature date </div>
DOT Advisory Circular AC 431.35-2: Reusable Launch and Re-entry Vehicle – System Safety Process (FAA Requirement)		<div style="text-align: right;"> <div style="border-bottom: 1px solid black; width: 150px; display: inline-block;"></div> <div style="border-bottom: 1px solid black; width: 100px; display: inline-block;"></div> </div> <div style="text-align: right;"> Signature date </div>

Notes:

1. Discipline Champion is responsible for identifying specific level of understanding required for each document. (See section 4.1).
2. Program specific standard: Demonstrate in-depth knowledge of those that apply to your assignment, and demonstrate an understanding of the differences between standards for different programs.

**APPENDIX C: PDRM for System Safety Engineers:
EXPERT Qualification Requirements**

ON THE JOB TRAINING Complete the following activities in any sequence (Note 1)		SUPERVISOR SIGNATURE/ DATE COMPLETE
Lead a team creating system safety “Checklists” in support of a NASA project or program.		<div style="border-bottom: 1px solid black; width: 100%;"></div> <div style="display: flex; justify-content: space-between; padding: 0 10px;"> Signature date </div>
Lead a team conducting a hazard analysis in support of a NASA project or program		<div style="border-bottom: 1px solid black; width: 100%;"></div> <div style="display: flex; justify-content: space-between; padding: 0 10px;"> Signature date </div>
Participate in, and contribute leadership to, a team creating a Fault Tree in support of a NASA project or program.		<div style="border-bottom: 1px solid black; width: 100%;"></div> <div style="display: flex; justify-content: space-between; padding: 0 10px;"> Signature date </div>
Demonstrate in depth understanding of the purpose of a FMEA/CIL, and the relationship to a hazard analysis.		<div style="border-bottom: 1px solid black; width: 100%;"></div> <div style="display: flex; justify-content: space-between; padding: 0 10px;"> Signature date </div>
Become a mentor for others in System Safety. Guide other team members, including design team members, to understand the importance and benefits of upfront System Safety efforts, to influence the design and to provide high value contribution to the program.		<div style="border-bottom: 1px solid black; width: 100%;"></div> <div style="display: flex; justify-content: space-between; padding: 0 10px;"> Signature date </div>
Participate in activity to establish guidelines and processes for a stronger system safety Discipline at NASA.		<div style="border-bottom: 1px solid black; width: 100%;"></div> <div style="display: flex; justify-content: space-between; padding: 0 10px;"> Signature date </div>
Conduct, lead or contribute significantly to benchmarking studies within NASA, DOD and other Industries to achieve		

APPENDIX C: PDRM for System Safety Engineers: EXPERT Qualification Requirements

superior S&MA system safety processes.		_____ Signature date
Regularly lead or proactively participate in design reviews, and support program and project reviews		_____ Signature date
Obtain relevant external professional qualification (e.g. Certified safety Professional from the Board of Certified Safety Professionals). (Highly recommended, but not required at this time).		_____ Signature date
Provide leadership to professional society or inter-program or inter-center activities (e.g.: working groups defining standards, coordinating groups to achieve cross organizational standards, society committees/ subcommittees doing work to advance the discipline).		_____ Signature date

Notes:

1. Candidate should work with his/her supervisor to identify specific applicable assignments. Discipline Champion may be consulted to ensure proposed assignments satisfy qualification requirements.

APPENDIX D: PDRM for System Safety Engineers: Application for Qualification

This application is for (Check One):

___ Entry into the PDRM Qualification process as an Apprentice;
All prerequisites identified in Appendix A have been satisfied

___ NOVICE Qualification
Appendix A is Attached and approved

___ JOURNEYMAN Qualification
Appendix B is attached and approved

___ EXPERT Qualification
Appendix C is attached and approved

Name of Candidate: _____

Organization: _____

Building/Location: _____

Phone: _____ Email: _____

Signatures:

Candidate Signature: _____ Date: _____

Discipline Champion: _____ Date: _____

Supervisor Signature: _____ Date: _____

S&MA Director: _____ Date: _____

APPENDIX E: PDRM for System Safety Engineers: Discipline Declaration Form

Professional Development Roadmap Discipline Declaration

I _____, hereby declare my intention
to pursue one of the following core disciplines:

_____ System Safety Engineer

_____ Reliability & Maintainability Engineer

_____ Quality Assurance

_____ Engineers

_____ Specialist

_____ Safety and Occupational Health Specialist

I have chosen the following discipline mentor: -

(org. and name)

The following signatures acknowledge commitment on their part:

Mentor Signature: _____

Date: _____

Supervisor Signature: _____

Date: _____

Discipline Champion Signature: _____

Date: _____

My Organization:

Building/Room:

Phone: _____

E-mail: _____

Signature: _____

Date: _____

**APPENDIX F: PDRM for System Safety Engineers:
Incentive Program for S&MA Professional Development Program**

December 1, 2004

QD01 (04-075)

TO: Distribution

FROM: QD01/N. Jan Davis, Ph.D.

SUBJECT: Incentive Program for Safety & Mission Assurance
(S&MA) Professional
Development Program

The S&MA Directorate wants to encourage and reward our team members as they progress through the levels in the Professional Development Program in their chosen discipline. In this effort, S&MA has created a monetary incentive program to help encourage participation in the qualification program. The monetary incentive program is as follows:

\$100 for baseline qualification as a Novice
\$300 for baseline qualification as a Journeyman
\$500 for baseline qualification as an Expert

\$100 for qualifying as a Novice
\$200 for a Novice qualifying as a Journeyman
\$200 for a Journeyman qualifying as an Expert

In addition, a ceremony with family members will be conducted to celebrate qualification accomplishments and witness the presentation of qualification certificates and awards.

To begin the qualification or baseline process, review the Professional Development Roadmap (PDRM) for your selected discipline and complete the attached form which documents your intent to pursue qualification and identifies your mentor. Then fill out the PDRM as completely as possible, documenting classes taken and/or classes taken that are equivalent to the classes in the PDRM, work experience that is relevant to PDRM on the job requirements, and knowledge and skills. After completing these items, meet with the Discipline Champion and your Supervisor to discuss your recommended qualification level. The completed package with appropriate endorsement will then be forward to the Qualification Review Board for review and adjudication.

APPENDIX F: PDRM for System Safety Engineers: Incentive Program for S&MA Professional Development Program

PDRM's can be found at:

<https://msfcsma3.msfc.nasa.gov/dbwebs/apps/vsma/roadmaps.asp>. If
you need assistance with any of the items listed contact your
Discipline Champion:

System Safety:	Sherry Jennings	4-2256
Reliability & Maintainability Engr:	Prince Kalia	4-6871
Quality Assurance Engineer:	Ken Crane	4-8025
Industrial Safety Specialist:	Judy Milburn	4-4802

As a recognized discipline expert, you can expect to be assigned to the higher profile and more challenging project assignments. Good luck in your pursuit of this goal.

Original Signed By:

N. Jan Davis, Ph.D.
Director
Safety and Mission Assurance Directorate